

## Optimization Problems

**Example 1:** If  $1200 \text{ cm}^2$  of material is available to make a box with a square base and an open top, find the largest possible volume of the box.

**Example 2:** A right triangle in the first quadrant has one vertex at the origin and one vertex on the curve  $y = e^{-x/3}$  for  $1 \leq x \leq 5$ . One of the two perpendicular sides is along the  $x$ -axis; the other is parallel to the  $y$ -axis. Find the maximum and minimum areas of such a triangle.

**Example 3:** Find the point on the graph of  $y = \sqrt{x}$  which is closest to the point  $(3, 0)$ .

**Example 4:** A square-bottomed box with a top has a fixed volume  $V$ . Which dimensions of the box minimize the surface area?